

A photograph of the Stony Brook University Physics and Astronomy Department building. The building is a multi-story brick structure with large windows. In the foreground, there is a large, circular, green sculpture with a hole in the center, mounted on a pedestal. The sky is blue with some clouds. The text "Overview of the Stony Brook Dept. of Physics and Astronomy" is overlaid at the top in black, and "Welcome to Stony Brook!" is overlaid below it in red. At the bottom right, the text "DUNE FD3 Mini-Workshop June 26, 2023" is overlaid in yellow.

# Overview of the Stony Brook Dept. of Physics and Astronomy

**Welcome to Stony Brook!**

**DUNE FD3 Mini-Workshop  
June 26, 2023**

# Brief History of Stony Brook

## Department of Physics and Astronomy

- 1957: Establishment of a college in Oyster Bay, LI for the preparation of secondary school teachers of mathematics and science
- 1962: New campus at Stony Brook
  - State University of New York (SUNY) at Stony Brook (Official Name)
  - Now, also known as, Stony Brook University (SBU)
- 1966: Arrival of “Frank” C.N. Yang at Stony Brook (from IAS, Princeton) as the founding director of newly established Institute for Theoretical Physics and Albert Einstein Professor of State of New York
  - Instant rise in the visibility of the department and the university both nationally and internationally
- ~1997: Formation of the Department of Physics and Astronomy
  - Astronomy moved from the Dept. of Earth and Space Science
- 1999: ITP named as the **C.N. Yang Institute for Theoretical Physics (YITP)**
- 2007: Establishment of Simons Center for Geometry and Physics (SCGP)
- 2022: Designation of SBU as one of two SUNY Flagship Universities

# The Defining Year for Stony Brook Physics (Department Photo: 1966)



M. Dresden C.N. Yang J. Toll

A. Pond

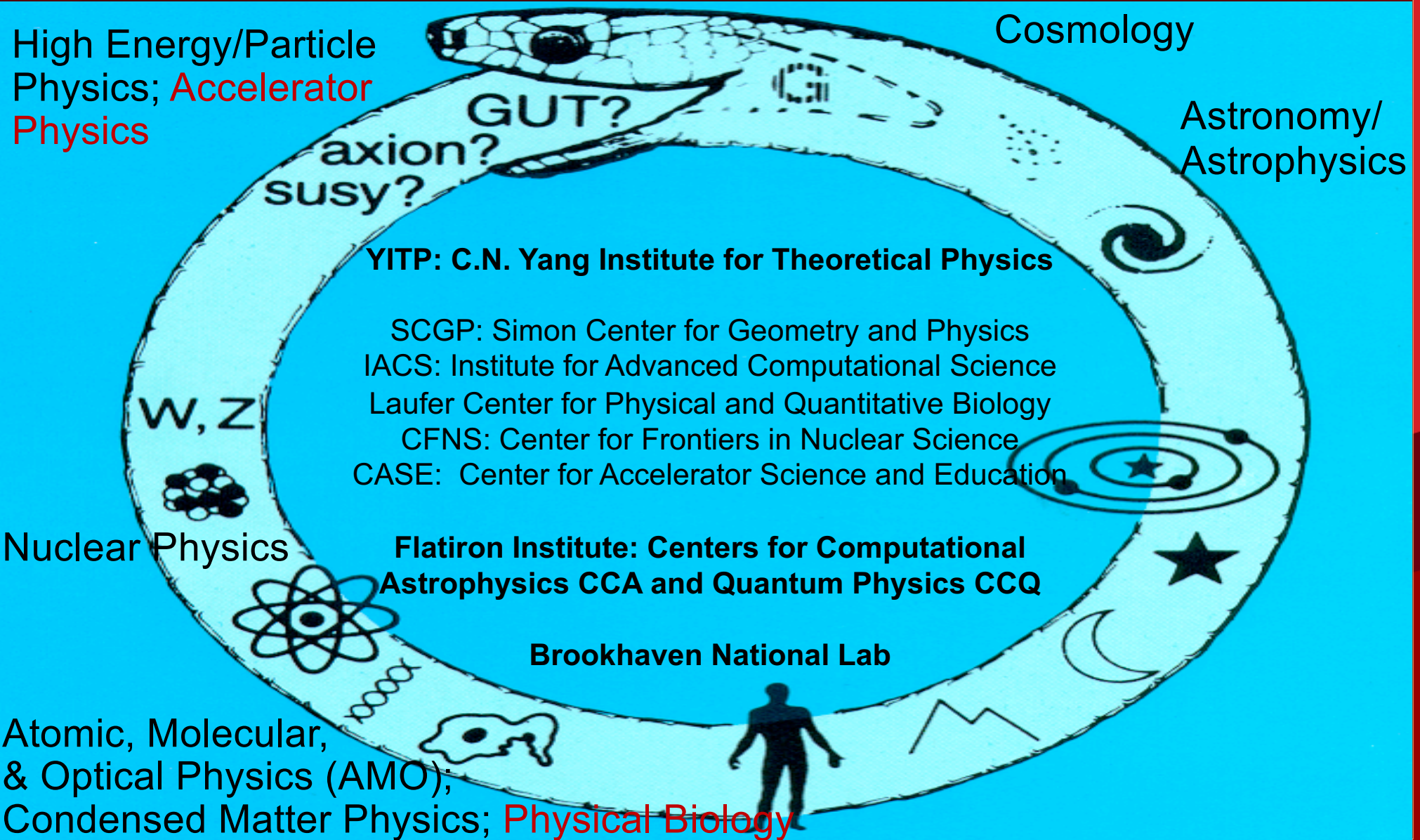


# SBU Physics & Astronomy Today

- SBU: One of the two Flagship universities of the SUNY system
  - Manages Brookhaven National Lab (BNL) partnered w/ Battelle
- P&A Department
  - 70+ Faculty
  - 30+ Adjunct and Affiliated Faculty
    - 26 from Brookhaven National Lab (BNL)
    - 9 from other Stony Brook Departments
  - 60+ Postdocs and Research Scientists
  - 200+ Graduate Students
  - 400+ Undergraduate Majors

A comprehensive department w/ well  
balanced excellence in all major areas of  
Physics and Astronomy

# Research Areas, Centers and Affiliated Institutions



High Energy/Particle Physics; Accelerator Physics

Cosmology

Astronomy/Astrophysics

**YITP: C.N. Yang Institute for Theoretical Physics**

SCGP: Simon Center for Geometry and Physics  
IACS: Institute for Advanced Computational Science  
Laufer Center for Physical and Quantitative Biology  
CFNS: Center for Frontiers in Nuclear Science  
CASE: Center for Accelerator Science and Education

Nuclear Physics

**Flatiron Institute: Centers for Computational Astrophysics CCA and Quantum Physics CCQ**

**Brookhaven National Lab**

Atomic, Molecular, & Optical Physics (AMO); Condensed Matter Physics; Physical Biology

# SBU HEP Group

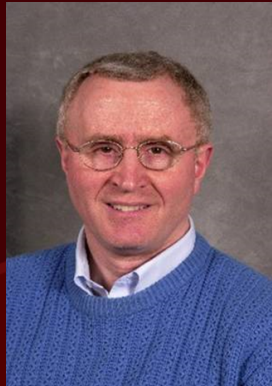
- Collider Group
  - D0 at TeVatron (Grannis et al.), ...
  - **ATLAS at LHC (Hobbs et al.)**
- Neutrino and Nucleon decay (NN) Group
  - **Super-Kamiokande**
  - K2K
  - UNO
  - Henderson DUSEL
  - **T2K**
  - CAPTAIN
  - **DUNE**
  - **(THEIA)**

# High Energy Physics (HEP) Group

## Hadron Collider Group – ATLAS at LHC



John Hobbs



Bob McCarthy



Giacinto Piacquadio



Michael Rijssenbeek



Dmitri Tsybychev

Two new assistant profs starting in Jan 2024: Hannah Arnold and Valerio Dao

## Neutrino and Nucleon decay Group – T2K, DUNE, Super-Kamiokande ..



Chang Kee Jung



Clark McGrew



Michael Wilking

# Next generation Nucleon decay and Neutrino (NNN) detector Workshop Series

Workshop for the  
**Next Generation Nucleon Decay  
and Neutrino Detector (NNN99)**

**September 23 - 25, 1999**  
**SUNY at Stony Brook, NY, USA**

**Working Groups:**  
**Nucleon Decay**  
**Neutrino Oscillations**  
**Neutrino Astrophysics**

**For more information, please contact:**

Joan Napolitano, *Conference Secretary*  
HEP group, Dept. of Physics and Astronomy  
SUNY at Stony Brook, NY 11794-3800, USA  
PHONE: 516-632-8095  
FAX: 516-632-8101  
EMAIL: nnn99@superk.physics.sunysb.edu

**Further information and registration:**

<http://superk.physics.sunysb.edu/NNN99/>

**NNN99 International Advisory Committee**

J. Bahcall, *IAS*  
R. Cowsik, *IAS*  
L. DiLella, *CERN*  
G. Feldman, *Harvard*  
T. Gaisser, *Bartol*  
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Y. Totuzuka, *ICRR*  
F. Wilczek, *IAS*  
S. Wojcicki, *Stanford*  
C. N. Yang, *Stony Brook*

**NNN99 Organizing Committee**

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M. Diwan, *BNL (Co-chair)*  
R. J. Hahn, *BNL*  
C. K. Jung, *Stony Brook (Co-chair)*  
T. Kajita, *ICRR*  
R. McCarthy, *Stony Brook*  
C. McGrew, *Stony Brook*  
K. K. Ng, *Stony Brook*  
A. Rubbia, *ETH/Zurich*  
D. Schamberger, *Stony Brook*  
R. Shrock, *Stony Brook*  
H. Sobel, *Chair, International Advisory Committee*  
B. Svoboda, *LSU (Chair, Program Committee)*  
C. Yanagisawa, *Stony Brook*





# Next generation Nucleon decay and Neutrino (NNN) detector Workshop Series

## NEXT GENERATION NUCLEON DECAY AND NEUTRINO DETECTOR

NNN99

Stony Brook, New York 1999

EDITORS  
Milind V. Diwan  
Chang Kee Jung

AMERICAN  
INSTITUTE  
OF PHYSICS

AIP CONFERENCE PROCEEDINGS ■ 533

### Feasibility of a Next Generation Underground Water Cherenkov Detector: UNO

Chang Kee Jung

*The State University of New York at Stony Brook, Stony Brook, New York 11794-3800, USA*

**Abstract.** The feasibility of a next generation underground water Cherenkov detector is examined and a conceptual design (UNO) is presented. The design has a linear detector configuration with a total volume of 650 kton which is 13 times the total volume of the Super-Kamiokande detector. It corresponds to a 20 times increase in fiducial volume for physics analysis. The physics goals of UNO are to increase the sensitivity of the search for nucleon decay by a factor of ten and to make precision measurements of the solar and atmospheric neutrino properties. In addition, the detection sensitivity for supernova neutrinos will reach as far as the Andromeda galaxy.

### Study of 1 Megaton water Cherenkov detectors for the future proton decay search

M. Shiozawa\* **HyperK**

*Kamioka Observatory, ICRR, University of Tokyo  
Higashi-mozumi, Kamioka-cho, Gifu 500-1205, JAPAN*

**Abstract.** The sensitivity of a possible future 1 Megaton water Cherenkov detector for proton decay searches was studied. For  $p \rightarrow e^+ \pi^0$  decay mode, the detection efficiency and the number of atmospheric neutrino backgrounds were estimated by using a detailed Monte Carlo simulation program. Moreover, their dependence on the number density of the photomultiplier tube (PMT) was investigated. With the PMT density of the Super-Kamiokande detector (2 PMT/m<sup>2</sup>, 40% photocathode coverage), we will reach to  $1.5 \times 10^{35}$  years partial lifetime limit at 90% confidence level by 10 years livetime of the detector ( $10^4$  kton-year exposure). With a 1/4 (1/9) PMT density, the sensitivity for  $p \rightarrow e^+ \pi^0$  mode is decreased to  $1 \times 10^{35}$  years ( $7 \times 10^{34}$  years).

### Nucleon Decay studies in a large Liquid Argon detector

A. Bueno<sup>1</sup>, M. Campanelli<sup>1\*</sup>, A. Ferrari<sup>2</sup>, **A. Rubbia<sup>1</sup>**

<sup>1</sup> *Institut für Teilchenphysik, ETHZ, CH-8093 Zurich, Switzerland*  
<sup>2</sup> *CERN, CH-1211 Geneva 23 Switzerland*

**Abstract.** Future nuclear decay experiments have to be able to combine a large mass, the capability of distinguishing between several possible decay channels and a good background discrimination, in order to increase their sensitivity linearly with the mass. We present the capabilities of the liquid Argon technology to fulfill these requirements.

# The Stony Brook Simons STEM Scholars Program

- \$56.6M gift from the Simons Foundation
- To increase diversity in the STEM field
  - Emphasizing in URM
  - P&A and Math are “targeted” departments
- Full support for 50 scholars per year
  - The first cohort will arrive in summer 2023 and start in Fall 2023



# SBU Selected as the Anchor Institution of The New York Climate Exchange



A contingent of representatives from Stony Brook University, led by President Maurie McInnis, after the April 24 press conference with New York City Mayor Eric Adams announcing The New York Climate Exchange. Photos by John Griffin.

# Simons Foundation's Historic \$500M Gift to SBU Endowment



From left to right: Marilyn Simons, Stony Brook University President Maurie McInnis, Jim Simons and Simons Foundation President David Spergel toast the announcement of the Simons Infinity Investment. Photo by John Griffin.

**The Simons Foundation's contribution is the largest unrestricted endowment gift to a higher education institution in American history**

# Dr. Barry Barish, Nobel Laureate 2017 to Stony Brook



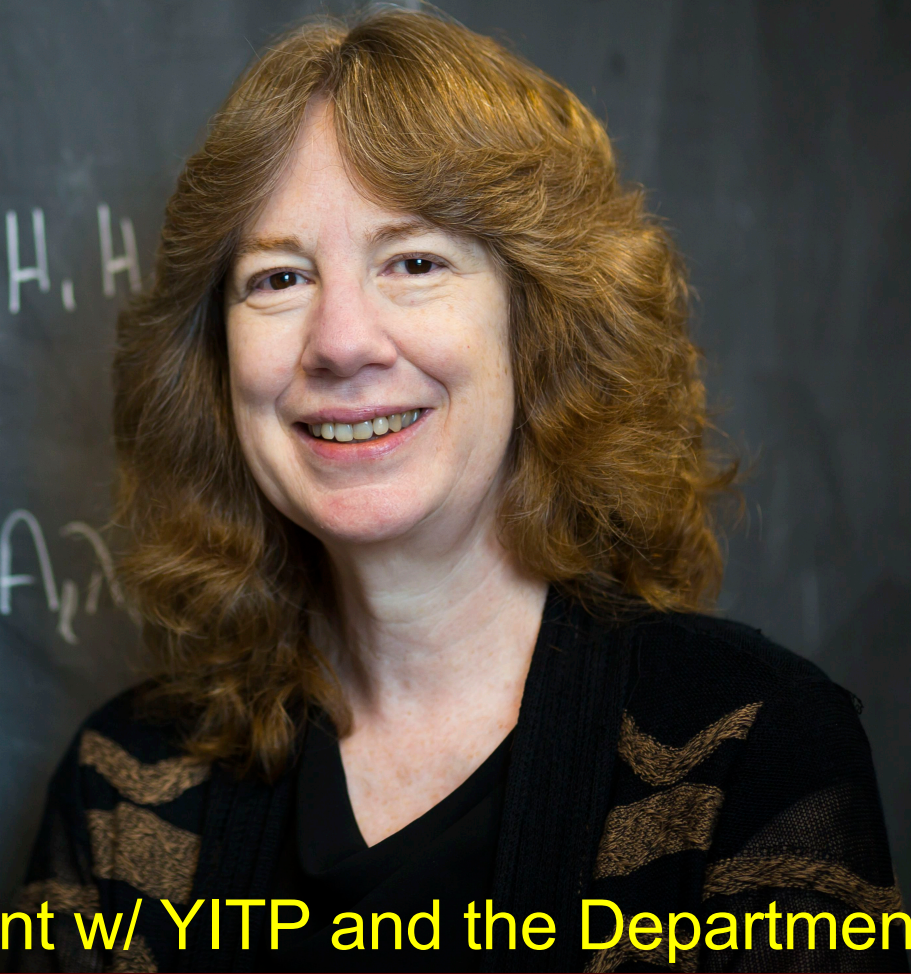
- Will serve as the Inaugural President's Distinguished Endowed Chair in Physics
- Will start in Sep. 2023
  - Resident in Stony Brook/NYC area for each fall semester
- Teach a new grad course: "Frontiers of Physics and Astrophysics"
  - Students can take the course for 0-3 credit hours
  - Will be an excellent course, especially for theory students

# JoAnne Hewett Becomes the New and First Ever Female Director at BNL

$$-m_u^2 \tilde{U}^+ \tilde{U} - m_D^2 \tilde{D}^+ \tilde{D} - m_L^2 \tilde{L}^+ \tilde{L} - m_e^2 \tilde{E}^+ \tilde{E}$$

$$-m_{H_2}^2 H_2^* H_2 - (\mu B H_1 H_2)$$

$$-A_d \lambda_d \tilde{D} \tilde{Q} H_1 - A_1 \lambda_1$$



Full Professor Appointment w/ YITP and the Department

**The End**

I wish you a fruitful and enjoyable workshop!